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RELATION OF LAND SUITABILITY AND PRODUCT QUALITY OF SALAK PONDOH
The Case in Turi Sub-district, Sleman Regency, Yogyakarta

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ABSTRACT

Evaluation of land suitability for salak pondoh (salak = snake fruit) is urgently needed to guarantee the increase and continuity of fruit production. Such a facility plays an important role viewed from the cultivation technique as well as from the economic aspects of management in understanding the condition of the land and the production limiting factors. The objectives of this study are to reveal the influence of land factors on sequences of salak pondoh growth, production quantity, production quality and ultimately the formulation of land suitability classification systems for salak pondoh.

The data collected were land components as well as salak pondoh growth variables, product quantity, and product quality. The data were processed using Cluster Analysis.

The arrangement of land capability classification based upon land factors that show upon salak pondoh growth and production besides, these factors can be rated based upon difference of production. Factors included in land capability classification in accordance with level will be the condition of soil effective depth and the altitude (air temperature and humidity) as the primary factors of difference for the order category, porosity and base saturation for class, and the soil pH for subclass. Based on rating of differing factor 3 orders, 8 classes and 11 subclasses had been compiled for land capability classification of salak pondoh. Considering the production limiting factor and the level of over-coming difficulties in the land classification, land suitability classification has been compiled.

Now it is known that there are 2 order of land suitability (Suitable and Not Suitable), and 5 classes and 10 subclasses.

The relation land suitability with quality product. The sequence of land suitability is located in the middle area (450-650 m. above sea level), up land area (650-900 m. above sea level), low land area (300-450 m. above sea level). For general quality of product as above mention, but for special quality of product, low land area is better than the middle area and up land area.

INTRODUCTION

Salak pondoh is a variety of salak (snake-fruit) that has gained popularity in the last decades. This variety has many advantages over other varieties already known in Indonesia. It does not cause constipation and stomach ache, although eaten before taking meal and in large quantity. In addition, it has a specific taste and aroma, sweet without bitterness even at immature age. The fruit contains large amount of calcium, which is very much needed for human bone growth.

Besides *salak pondoh*, Indonesians have known other varieties, like *salak* Banjarnegara, *salak* Condet (Jakarta), *salak* Manonjaya, *salak* Bali, *salak* Madura, *salak* Malang, *salak* Padang Sidempuan (Tapanuli), *salak* Nglumut (Magelang), etc. *Salak* has many other names. In Burma it is called *yingan*, in Thailand *sala*, in The U.K. *snake fruit*. (Schuiling and Mogea,1992). Different varieties have different taste and aroma. *Salak pondoh*, which belongs to *Salacca edulis Reinw* species (Backer and van der Brint Jr., 1963), the correct name is Salacca zalacca var zalacca (Mogea, 1982), is now getting popular among the Indonesians and gets special attention from the farmers and the government for cultivation.

In the Sleman regency, people are encouraged to cultivate *salak pondoh*. At Turi, Tempel and Pakem sub districts, people have allotted some of their lots of land to cultivate this variety. Although lacking scientific knowledge of micro-land suitability, people have

been able to produce *salak pondoh* with their limited knowledge and experience. It would be much better if they have sufficient knowledge of micro-land suitability.

The author felt that it is necessary to conduct a study, because this variety was in many cases different from the local varieties At Turi, Tempel and Pakem sub-district it was found that although the management (fertilizing, maintaining and planting technique) was the same, the harvest yields varied. This indicates that a guideline as to the micro-land suitability is necessary. The farmers not only need knowledge of the maintaining, seeding and fertilizing system, but also a basic knowledge of the micro-land suitability (climate, soil and weather conditions) for *salak pondoh* optimal production.

In order to assess the suitable land condition for the growth and production of *salak pondoh* and to make a classification of land suitability related to the quality product, the author has conducted a study *at Turi Sub-District, Sleman Regency, Yogyakarta Special Territory Province.*

The approach to the case was inductive, using Turi subdistrict as the area of study The steps taken in the study were: determining plots to be observed, collecting data, analyzing materials in the laboratory, and processing and classifiying data of land suitability.

OBJECTIVE

This study was to find the relation between growth and production differences in different land conditions related to the quality product.

METHOD

The observation plots were based on the topography and soil effective depth in three locations, i.e. Bangunkreto, Wonokerto, Girikerto.

Observation Plots Table

Locations	Altitudes (meters above sea level)	Combinations
Bangunkerto	300-450	$L_1J_1T_3$, $L_1J_2T_3$, $L_1J_3T_3$, $L_1J_4T_3$, $L_1J_1T_1$, $L_1J_2T_1$, $L_1J_3T_1$, $L_1J_4T_1$
Wonokerto	450-650	$L_2J_1T_3$, $L_2J_2T_3$, $L_2J_3T_3$, $L_2J_4T_3$, $L_2J_1T_2$, $L_2J_2T_2$, $L_2J_3T_2$, $L_2J_4T_2$.
Girikerto	650-900	$L_3J_1T_3$, $L_3J_2T_3$, $L_3J_3T_3$, $L_3J_4T_3$.

Notes :

L = Altitude above sea level
(L_1=300-450 m above sea level; L_2=450-650 m above sea level; L_3=650-900 m above sea level)
J = Soil effective depth
(J_1<30 cm ; J_2=30-60 cm ; J_3=60-90 cm ; J_4=90-120 cm)
T=Soil types
(T_1=Entisol; T_2=Incentisol; T_3=Andisol)
Observation plot size was 10 x 10 m^2.

The study of land suitability for *salak pondoh* had two main variables, i.e. land variable as independent variable, and plant variable as dependent variable. Therefore, the data needed were of two kinds, i.e. land components and plant components. In general, the data comprised of land components, consisting of soil components and micro-climate components, and plant components.

In order to assess the land, fruit and morphological characteristics laboratory analyses were made. The laboratory analyses were done according to Soil Analysis (Sujadi, et al.,

1989) . For the fruit components in addition to the laboratory analysis of fresh fruit, the discussion panel technique (Sukarto et al., 1992) was used.

According to Davis (1973), the Cluster Analysis is effective and suitable to show the complex interrelation among objects being studied. The analysis system is based on hierarchical classification, and therefore, it is suitable for classifying land which, at the same time, is a hierarchical classification system.

The final results of the Cluster Analysis were represented in complete dendograms. Dendograms help in determining kinds of distinguishing factors in land classification.

The kinds of distinguishing factors for land classification were then used as parameters in classifying land suitability taking into account factors that limit production. With the production data available, land suitability in the order level can be constructed (Sys et al., 1991).

RESULT AND DISCUSION

The cultivation of *salak pondoh* begins with planting extracted sprouts. At the age of 2.5 to 3 years plants can already bear fruit, and will bear fruit continually after reaching 5 years. From the field survey, it was observed that *salak pondoh* plants after reaching the harvest age would produce one leaf sheath, one sprout and one flower bud per month. If this is taken care of, the productivity can increase twice or three times. (Padmosudarso, S.,2000).

The *salak pondoh* plant flowered for the first time between the age of 2 and 2.5 years. After reaching that age, the following stages can be observed: (1). the flower bud at 1-2 months old is not visible; (2). at 2-3 months of age the flower bud is visible; (3). at 5-6 months of age the flower blooms to the optimum, and then fertilization took place naturally or with human aid; (4). after fertilization the flower changed into young fruit and (5). the young fruit developed into ripe fruit (Imam, S.,1995)

The *salak pondoh* fruit can be eaten before getting ripe, but the fruit has not reached the maximum quantity and quality. Five months after fertilization the fruit is crispy. The optimum quality is reached at 5.5 - 6.5 months after fertilization. Seven months after fertilization the fruit becomes sandy, and 8 months after fertilization the fruit will fall and get rotten.(Suhardi, 1994.)

Land components data (soil, topography, micro-climate and plant) from the observation plots were analyzed using the Cluster Analysis. The data with 73 variables produced dendograms. In this study , dendograms based on coefficient of correlation with cophenetic correlation coefficient 0.7377 (less than 0.8), while dendograms based on distance coefficient with cophenetic coefficient correlation 0.9720 (more than 0.8) will be used for further discussion.

Based on the dendograms and land capability classification, taking into account production limitating factors, there are two orders of land suitability: (1). Suitable (S) order, soil effective depth 30-120 cm and altitude 300-900 m above sea level, belongs to good land capability (B) and good land potentiallity (PB); (2). Unsuitable (TS) order, soil effective depth 0-30 cm and altitude 300-900 m above sea level, belongs to order of low potential land capability (PR). By entering production limiting factors to order, five classes and 10 sub-classes were derived:

1. Very suitable class (SS), i.e. suitable order without production limiting factors, belongs to subclass land capability BPtVtHn.
2. Suitable class (S), i.e. suitable order with main production limiting factors of soil effective depth of 60-90 cm or without one of the class limiting factors with or without land capability sub-class limiting factor. This class has two subclasses:
   a. Sjn, limiting factors soil effective depth 60-90 cm and soil pH slightly acid, belongs to land capability BPtVtHam subclass;
   b. Sjv, limiting factors soil effective depth 60-90 cm with low base saturation, belongs to land capability BPtVrHn subclass.
3. Slightly suitable class (AS), i.e. suitable order with one or two other limiting factors besides soil effective depth. This class has four subclasses:

a. ASjh, limiting factors: soil effective depth 30-60 cm, pH slightly acid, belongs to land capability PBPtHam subclass.
b. ASjp, limiting factors: soil effective depth 30-60 cm with low porosity, belongs to land capability PBPtVrHn subclass.
c. ASjvh, limiting factors: soil effective depth 30-60 cm with low base saturation and pH slightly acid, belongs to land capability PBPtVrHam subclass.
d. ASjph, limiting factors: soil effective depth 30-60 cm, low porosity and pH slightly acid, belongs to land capability PBPrVtHam subclass.

4. Actually Unsuitable class (TSS), the unsuitable order with limiting factors: only soil effective depth or one other limiting factor, this class has two subclassess:
   a. TSSj, limiting factor: shallow soil effective depth, i.e. 0-30 cm, belongs to PRPrVtHn subclass.
   b. TSSjh, limiting factors: soil effective depth 0-30 cm and soil pH slightly acid, belongs to PRPtVrHam subclass.
5. Actually and Potentially unsuitable class (TST), unsuitable order with two limiting factors besides soil effective depth. This class has two subclasses:
   a. TSTjvh, limiting factors: soil effective depth <30 cm, low base saturation and pH slightly acid, belongs to land capability PRPtVrHam subclass.
   b. TSTjph, limiting factors: soil effective depth <30 cm, low porosity and pH slightly acid, belongs to PRPrVtHam subclass.

The quantitative land suitability relation based on *salak pondoh* production needs to be related to fruit quality. The fruit quality is classified into two groups: (1). general yield quality, and (2). specific yield quality. General yield quality was judged visually from visible appearance, like fruit size, fruit uniformity, and fruit defects; and organoleptically, i.e. through other senses: sweetness, aroma, sourness and crispness. The evaluation using these parameters was done by panelists which consisted of 25 people. Specific quality evaluation was done organoleptically to determine the *pondoh* specific quality based on: (1). crispness, (2). aroma, (3). sweetness; and (4). sourness.

The general quality order was basically similar to the land suitability, i.e. the middle altitude was better that the upper altitude and lower altitude. As for the specific quality order, the lower altitude was better than the middle altitude and the upper altitude and the middle altitude is better than the upper altitude. Therefore the quantitatively suitable land may not be suitable for specific quality.

The Andisol with deep soil effective depth, at 450 - 650 m above sea leavel, high porosity, high base saturation, and neutral pH as soil characteristic of land suitability unit for salak pondoh.

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